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PROGRESS REPORT

(NASA ORDER ~~NO.~~ R-39)

3p

CONDUCT RESEARCH ON THE EFFECT OF VERY STRONG FIELDS
AND OF MAGNETIC FIELD-FREE ENVIRONMENTS ON MAN AND ANIMALS

UNPUBLISHED PRELIMINARY DATA

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By

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Recent progress was made on this project in the field of exposure of animals to very high magnetic fields. Instrumentation and methods are being assembled for the exposure of man to very low magnetic fields and to high fields.

Exposure of animals to very high magnetic fields:

A new procedure of exposure was tried in coils used for pulse forming of metals. Marshall Space Flight Center, Huntsville, Alabama, made their facilities and experience available for this study. The experiments were made in a field of maximal 300,000 gauss acting for a few microseconds during discharge of a condensor. Mice survived this treatment which is able to form metals in desired shapes. A human hand held a short distance from the coil feels a prickling sensation. Operating personnel described an involuntary stretching of the arm and considerable pain the abdomen if these parts of the body came in close proximity to a coil during the pulse discharge.

These observations are of great interest since pulse forming is in progress of being developed as a tool for metal forming in space, and since the effects of a sudden breakdown of a large magnetic field used in other space applications would have the same effects. The observations belong in the class of phosphene effects which were observed for the first time around the turn of the century, and we have extended the effects of fast changing fields to parts of the body other than the eye.



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New observations have also been made during experimentation in the high field magnets of the Naval Research Laboratory, Washington, D. C. Positive effects of the magnetic field were noticed in a study of cell division and also in connection with the heart rate of mammals. The first stages of cell division of sea urchin eggs are delayed in fields of 140,000 gauss. The heart rate of a squirrel monkey changed in rate and regularity during changes of magnetic fields of maximal 70,000 gauss field strength. This observation is of great interest in connection with human exposure, and an early repetition of the original experiment is planned. A number of experiments in fields of 140,000 gauss did not show any noticeable effect of the field. The luminescence of photobacteria was not changed. A preliminary evaluation of a study of Drosophila in which eggs, larvae, pupae, and adult animals were exposed did not indicate a genetic effect of very strong magnetic fields. First results on exposure of Neurospora also did not indicate any genetic effect. Dr. DeBusk, Institute of Molecular Physics, Tallahassee, Florida, who collaborated on this study, has not yet reported his results.

More detailed reports on these observations will be given in the near future. All participants in this study feel that the influence of magnetic fields on living tissue is a fascinating working field and want to express their appreciation for the support by NASA officials.